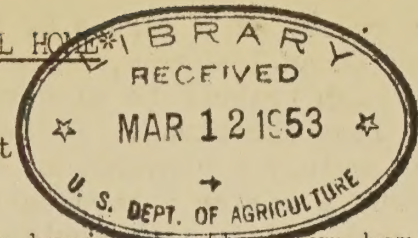


ELECTRICITY PAYS ITS WAY IN THE RURAL HOME

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Farming is a family business--on most farms. In this business, the farm homemaker is a valuable and versatile partner, worth about \$69,000 to the business, according to a Minnesota professor of economics. Even the children are valuable assets in the farming firm. The homemaker helps carry part of the farming load, in addition to her homemaking services. These in themselves on a replacement basis have been figured at one time or another as worth between \$3,000 and \$9,000 per year. The homemaker helps plan, operate and manage the farming business. And electricity helps the homemaker. It helps her produce, provide and prosper. It gives her time to plan, to manage, to evaluate. And it helps give her the strength or energy to run her big job. It also releases some time for her to get more information about doing her job better.

Farm families value electricity's contribution to family living satisfactions, to production jobs, to homemaking tasks, to home and community stabilization, to national security and even to international security. Let's take a look at how farm folks feel about electrical equipments' benefits:

Farm Families Evaluation of Electrical Equipment Benefits

Added comfort rates first, and greater freedom in use of evening hours second, in the values farm homemakers place on the benefits of electrified living to themselves and their families, one study shows.

In rating electricity's contribution to managerial factors, they placed energy saving first, time saving second and the possibility of getting more work done in a day's time third. Less than one half of the women ranked money saved as "of great importance"; another one fourth thought it "of moderate importance." One fourth considered money saved "of little or no importance."

According to opinions of 200 farm women in a survey made by Maude Wilson of the Oregon Experiment Station, these were the results in more detail:

Benefits as Classified by Homemakers Using Electricity	Of Great Importance percent	Of Moderate Importance percent	Of Little or No Importance percent
Greater comfort.....	93.5	5.9	0.6
Greater freedom in use of evening hrs..	91.5	6.9	1.6
Energy saved.....	88.9	10.6	0.5
Work more pleasant.....	86.7	12.8	0.5
Home more attractive at night.....	87.2	11.2	1.6
Work done more quickly.....	83.5	14.4	2.1
Family better informed.....	80.7	16.1	3.2
Better housekeeping results.....	70.8	25.5	3.7
More work done in a day's time.....	68.3	22.6	9.1
Work safer.....	55.7	27.9	16.4
Family healthier.....	54.6	34.6	10.8
More uniform products.....	50.8	30.9	18.3
More time for recreation.....	46.0	34.2	19.8
Money saved.....	45.6	27.8	26.6
Several tasks carried on simultaneously	38.5	37.3	24.2

*A fully annotated, more complete paper will be available by Sept. 1952 from Rural Electrification Admin., U. S. Dept. of Agriculture, Washington 25. D. C.

As a result of a survey of 461 farms selected at random to represent 37,850 farms in an Iowa area, these statements are made: "Interviewed farmers usually gave high tribute to electricity for making farm life more pleasant and farm work less laborious. Individual responses ranged from some who considered it to be mainly a convenience to those who said they would be more willing to do without a car or a hard-surfaced road than without electricity. Lighting in the home and in the service buildings received the greatest appreciation, with water systems a close second.

"Some farmers said electrification had meant saving in labor and benefits from timeliness in doing some jobs, because these jobs had been taken over, wholly or partly, by the women and children of the family."

From this study the research people concluded, "It is evident that a complete understanding of the effect of electrification on the farm organization and the requirements for labor may be had only from more intensified research."

Similar useful information on our subject for today is available in six recent USDA reports of surveys made in sections of Georgia, Iowa, Kansas, Tennessee and eastern and northwest Washington. Here is an example from the Tennessee reports showing how farmers feel about electrification: "A compilation of general comments relative to the effect of electricity on farming and living indicated that farmers felt electricity was worthwhile. Of 422 replies, 414 were to the effect that electricity was of positive value; three of doubtful value, and five of negative value:

Summary of Comments on Electricity and Farm Living
422 Farms, Random Sample, East Tennessee, 1949

Comment	Number of Replies
Positive	
Wouldn't be without it.....	146
Increases the value of the farm.....	109
Worth more than it costs.....	43
Nice to have (or like it).....	38
Makes living or work easier.....	28
Worth what it costs.....	10
Wonderful.....	9
Saves time, money, or food.....	8
Worth about what it costs.....	8
Other favorable replies.....	15
Total.....	414
Doubtful.....	3
Negative ²	5
Grand Total.....	422

¹Includes statements such as; "could do without it," "no effect on farm or living," "Just as soon not have it."

²Includes statements such as; "Costs more than it is worth," "It's dangerous," or, "Prefer a gasoline motor for power on washer."

Lack of income is the main problem confronting farm families who want to get the benefits of rural electrification. The Georgia study states some general conditions of interest and noticed in all six USDA-BAE studies: "The prevalence of all types of household equipment using electric power seems to be related to income...The ability of farm people to purchase electric service, as well as other goods and services, is determined largely by their income regardless of the size or type of farm which they operate or their tenure status on the land...The high income farms as a rule had more of practically every kind of electrical equipment whether for the household or the farm than did the medium or low income farms. A significant part of the increase in future consumption of electricity is dependent upon the education of farm families to a wider use of equipment."

Dr. Robert Wayne Adams and Dr. H. H. London found that farm operators and professional workers (in Missouri) believed that rural girls (points 1-7) and women (points 1-10) should know several things in order to get the benefits of using electricity:

1. How to select and purchase household electrical equipment.
2. How to operate and care for household electrical equipment.
3. How to estimate the cost of operating household electrical equipment.
4. How to read a meter and figure a monthly electricity bill.
5. How to avoid overloading circuits and blowing fuses.
6. How to select and replace fuses.
7. How to plan the lighting of a room or building.
8. How to make simple repairs on household electrical equipment.
9. How to locate and eliminate the causes of blown fuses.
10. How to determine whether or not it would be profitable to buy electrical equipment.

Eleven additional points were listed for men and can be found in the article, "Uses of Electricity--An Educational Problem," published in the May 1948 issue of the Journal of Home Economics.

Order of electric equipment purchase, as shown by REA equipment saturation studies made at different periods in system development, indicate the combined influence of value farm families place on equipment and cost of equipment. For household equipment, this order with highest saturation percentage equipment first, is iron, radio, washer (in North; after refrigerator in South), refrigerator, toaster, vacuum cleaner, water systems, range, water heater.

In 1950, the magazine, Electricity on the Farm got 7,233 replies to a request for readers to send in the name of the one piece of electric equipment which helped them most in their farm operations and in their homemaking.

Highest ranking equipment rated most helpful in this order: water system, milker, range and refrigerator. Freezers, cleaners, irons, mixers, lighting, sewing machines and dishwashers ranked next and in that order. How much equipment is owned would probably greatly affect these opinions. Below are the complete results:

Most Helpful Home Equipment

Washer	2,325
Range	1,624
Refrigerator	1,165
Water System	429
Freezer	418
Vacuum Cleaner	306
Iron	206
Food Mixer	190
Lights	171
Sewing Machine	101
Dishwasher	40
Churn	32
Radio	27
Roaster	26
Ironer	23
Toaster	18
Clothes Dryer	12
Hot Plate	11
Stoker	10
Oil Burner	8
Pasteurizer	5
Furnace Blower	5
Clock	4
Shaver	3
Separator	3

Most Helpful Farm Equipment

Water System	2,735
Milker	2,257
Motor	552
Lights	296
Milk Cooler	168
Chick Brooders	159
Welder	121
Barn Cleaner	108
Electric Fence	90
Cream Separator	83
Barn Yard Lights	81
Water Heater	69
Feed Grinder	68
Saw	58
Tool Grinder	47
Grain Elevator	46
Drill	40
Poultry Lighting	35
Watering Devices	27
Hay Drier	21
Power Tools	20
Corn Sheller	15
Hay Hoist	12
Pig Brooder	12
Air Compressor	11
Animal Clipper	11

Perhaps, best of all a farm woman summarized electricity's value to her simply, as follows: "Electricity keeps me cheerful because it saves my food, my time, my energy, my money and most of all, my disposition. Electricity at our house means a happy wife and mother, happier father, happier children, a happier home."

What Educational Leaders Say About Benefits

Farm homemakers consider their equipment valuable to them and impress this fact strongly on the educational leaders who work with them. Here are a few comments from these leaders taken from answers in reply to a recent letter to them:

"From the standpoint of convenience and time and energy saved, I think electricity pays its way in the rural home. Having labor-saving equipment releases time for homemakers to do other things," a statement by an extension home management specialist, showed the trend of the thinking of extension home management specialists who expressed an opinion in reply to our letter to them about the subject.

Many of these specialists in a field directly or closely related to home electrification education work also expressed opinions such as this, "The money-saving or making-making angles are much less important to our women than time-saving and energy-saving."

One southern extension home management specialist in a low-cost power area wrote: "We have been so busy on using electricity and helping others to want it and get it for use that we have been rather negligent in being able to prove its value in dollars and cents."

Extension Service workers are skilled at learning homemakers' needs and meeting those needs, so this comment tells me that homemakers are not expressing need for this information.

This factor in low-cost power areas is confirmed by a letter from Helen Noyes, Extension Home Management Specialist of Washington saying, "I have been quite amazed since I came to the State of Washington how little thought is given by families to how much equipment costs to operate. The initial cost is always discussed, but I have had almost no questions coming from farm families about how much it will cost to operate a piece of equipment. We have relatively inexpensive electricity in the state and I suppose that that is the answer. When I worked in Michigan, the operating cost was always a feature which was considered in many parts of the state."

Margaret McCordic, Extension Economist - Home Management, Wisconsin, confirms Miss Noyes opinion of northern Midwest interest in operating costs: "I find families are very much interested in figuring the cost of operating the different pieces of electric equipment. The reason that they like to do this is because neighbors have told them that a certain piece of electric equipment costs too much to operate, so they either do not use it if they have it or do not purchase it. If this same family would figure the cost of operating, they could decide for themselves the cost of operating and also decide which piece they might conserve electricity with. I believe that they need to learn more about the full use of electricity to save time and energy. For instance, in the use of the electric range the proper temperature is important. If a housewife would use her minute minder to call her attention to the time to turn the heat down to keep the vegetable boiling, she would not only save on her electric bill but also on her cleaning time. It seems so hard for homemakers to realize that they can cook at a slow boil instead of a fast rolling boil. I think most people overcook their vegetables especially their frozen ones. The use of the minute minder certainly saves time and energy and improves quality."

In an article on "How Electric Appliances Pay Their Way" (Kitchen Reporter, October 1951) Willie Vie Dowdy, a southern extension home economist, says, "In the interest of good money management, every family should plan the purchase of electric equipment with the expectation that this appliance will pay its own way in the home."

One specialist's letter brought out two other important points on selection. She said, "Since any one of these pieces of equipment is an investment for the family, it is wise sometimes to put the selection on the basis of 'which will mean the most to us now?' There is also the morale factor to consider in relation to new electrical equipment. Sometimes the happiness which the equipment brings to the family is well worth the money spent for the equipment. This is particularly true in relation to the dishwasher."

"Electricity has been a factor in accounting for the large number of farm families who have built their own homes with little use of outside labor and with a great saving of money. Without the electric planer, electric drill and other electrical tools, few farmers would be able to find the time to build their homes." So says Helen C. Potter, Associate Specialist in Housing Research of the Agricultural Experiment Station at the University of California.

Arizona homemakers, 2,035 of them, in eight counties, are convinced that electricity does so much and costs so little in the field of better home lighting that they have carried it as a major topic in 1949-50-51 and -52. "The acceptance of 2,035 women may be a concrete example of cost not being too high for a recognized need," according to the State's Extension Home Management Specialist, Grace Ryan.

According to a letter from Pauline Bunting, Extension Specialist in Home Management, "Home lighting is one of the major projects in the Wyoming program this year. We emphasize that light is an important factor in achieving health and happiness in family living, for it is related to visual comfort, work simplification, use of space and environment. The large number of families purchasing and using food freezers, automatic washers, dryers and dishwashers is evidence of belief in electrical equipment paying its way in convenience, saving costs for food, labor, etc. Electricity has enabled families to improve living standards and sanitation by supplying water in the home. There is no question about its contribution but people need information and assistance in making full use of electricity."

The men also had a good word to say about benefits of electricity in the home. With all but a few back hill farmers, one extension agricultural engineer said, "Our farmers take electricity for granted. It is not so much a matter of justifying the electric energy as it is in justifying the cost of the equipment."

A few thoughtful words of caution came in a letter from M. L. Mungaard, Farm Electrification Extension Specialist of Nebraska. "If you make any reference to any time and energy saving studies, please make them easy to understand. One item which I do not believe is stressed enough is the effect that water systems, etc. have on the farm family's health. Also, I have often heard the question, that if the homemaker saves time and energy, what does she do with it. It is important to point out what she can do with her saved time. The homemaker can add to the labor supply on the farm, but the farmstead usually needs electrifying for her to accomplish the most work. In other words, it does no good to save her time if she has to go out and do work on the farmstead that electricity could eliminate or make possible for her to do."

A letter from C. V. Phagan, Extension Agricultural Engineer of Oklahoma makes a strong point, "The rapid expansion of electricity to rural homes and its acceptance by rural people for so many uses in the home is the best proof that electricity really pays its way. Most people are convinced that electricity does save time and energy and for this reason people are making use of electricity as fast as equipment is made available or as fast as they can make arrangements to purchase the equipment."

Fred Darr, who has been an electrification adviser on an Illinois REA-financed system since 1939 offers two proofs of electricity paying its way in the rural home, "Our members are continually increasing their use of appliances and equipment. Our January average was 358 KWH, per member; we have 3,500 members. When this cooperative started in 1939, the average, over a period of several months was only 40 KWH, per member, per month. It's definitely paying its way in rural homes and if one does not believe it, they should be here in the office on one of our rare outages. You'd think the world was coming to an end if service is interrupted for any length of time."

A request for help with this paper sent also to 150 women electrification advisers employed by REA borrowers brought a volume of wonderful stories, case studies and comments. Suggestions from their letters, and ideas from stories published in their member newsletters found their way into each section of this paper, especially the part on making money with electricity.

Editors of most of the 21 statewide REA newspapers also sent testimonial stories and ideas. This wonderful material carries the enthusiasm and excitement farm

folks feel about their electric service and what it does for people and communities. This feeling of the worth of rural electrification is transmitted in everyday contacts with educational workers and newspaper people employed by farmers to give information about choice, use and care of their equipment.

Some Results of Home Electrification in Rural Areas

Homemakers and educational leaders mention a number of results of home electrification on living in rural areas:

Management: Electric equipment is influencing management practices, living patterns, patterns of work, purchasing practices--in many ways changing women's ways of doing things. It gives time and strength to think, to plan, to evaluate.

Income: Farm electrification often improves income by permitting women or other family members to work outside of the home. Also it may permit women to help with farm work, to help lower production costs in different ways. Directly, it contributes to both quantity and quality of produce in certain phases of production. The movement of industries to rural areas and the establishment of new rural industries in rural areas affects income and also brings population changes.

Population: It may tend to encourage young farm women to stay in rural areas and marry farm men, to keep youth on the farm. There has been some decentralization to rural areas, creation of rur-urban or fringe rural areas around towns. The number of town people retiring to the farm is increasing with the spread of rural electrification.

Labor: Electricity substitutes for a lot of hired labor and keeps the workers who stay on the farm better satisfied through better living conditions and additional recreation. It helps women to handle some of farm men's work in war crises.

Housing: Improvement of housing, through painting and remodeling, has accompanied home electrification. Storage problems may change as a result of home electrification.

Attitude: Rural living is becoming a way of life, throughout life, for more rural people, rather than just a means of making a living to retire to town. Many a farm couple plans to retire on the farm, to improve the farm so that it makes living better for their children, whom they encourage to make farming a way of life.

Health: Home electrification has a psychological value to both younger and older women. It awakens new interests, teaches new methods, starts other changes in the home. Many older women help their daughters and their sons' wives to get equipment and thus feel that they contribute to their well being. Electrical equipment makes many direct contributions to health. It helps families with the added labor load during the child-bearing and child-rearing stages. It gives parents time and energy to play and grow with their children, to read, to think, to talk, to listen. It can aid women with heart diseases and other special health problems. It helps lighten the burden for aged women.

Conditions Affecting Time, Energy and Cost Saving Factors

Whether electricity pays its way in the home depends largely on certain very personal and widely varying factors:

1. Individual homemaker: Her health, her strength, her goals, information, training and skills; her interest in earning or saving money; her desire to save time and energy; her present management practices; her ability to change.
2. Family size, attitude and living conditions; type of farming.
3. Initial selection of equipment for time, energy and money saving features
4. Original cost of equipment, cost of "saving" features, and amount of equipment owned.
5. Arrangement of equipment; lighting of work centers.
6. Equipment operation practices applied by homemaker and family, or the way equipment is used. Continuance of present practices and standards or improvement of these with coming of new equipment.
7. Maintenance problems - quality of equipment, its care and repair.

Factors Affecting Savings Figures Quoted

Results obtained in experimental work and reported in case studies related to electrical savings are influenced and often colored by:

1. Attitude of subjects and person carrying on investigation--objective vs. promotional; negative or positive personality. In case studies, influence of novelty of equipment use, comparison with older methods and desire to get good results or win awards in prize letter contests.
2. Information and background of investigator, -knowledge of survey and sampling techniques, statistics, equipment, related subjects and practices involved. Lack of availability of qualified consultants to supply information in unfamiliar fields.
3. Money and time needed to make investigations. Expense of accurate instruments of measurement.
4. Ability to think and to set up controlled conditions of experiment.
5. Realistic practical comparisons vs. colored impractical ones. Proper interpretation of information obtained.
6. Various problems of investigational environment in natural home conditions or under laboratory conditions simulating usage in home. Accuracy of measuring instruments.

These few points suggest some of the problems involved in getting reliable information from laboratory research, surveys, or individual case studies. Some of our present-day information leaves more to be desired from one viewpoint or another because of factors such as these mentioned above. It is also sometimes difficult to interpret material and to compare information from different sources because of widely differing experimental conditions.

There is a lot of interesting and excellent material on savings through home electrification. Let us examine some of it.

Saving Time With Electric Equipment

From a summary of several state studies made by the U. S. Department of Agriculture's Bureau of Human Nutrition and Home Economics, we find that farm homemakers spend nearly 52 hours each week on homemaking, 9 hours on gardening and farm work, and 1/2 hour on other work, altogether a little over 61 hours. This total of nearly 62 hours is low for the unelectrified farm because it is an average of all farms studied, some of which were electrified as well as unelectrified.

Some studies show the unelectrified farm average workload to be about 63 hours per week or 9 hours a day. So the figures I am using are very conservative figures for the unelectrified farm, again 52 hours for homemaking, 9 for outside work and 1/2 hour for extra work a total of over 61 hours each week for 52 weeks in the year. This is about 10 months of 9-hour days for homemaking and 2 months for outside work.

Let's figure what these statistics mean for a year in terms of 8-hour days. It is 338 eight-hour days on homemaking, 58 on outside work, and 3 days on other work, a total of 399 eight-hour days in one 365-day year. That's 34 days or over a month's extra work if farm women are willing to work eight hours per day, seven days in the week. It's almost 3 months of extra work if you think in terms of a six-day week, and if you think farm women are worth as good working conditions as most other workers and white-collar folks in this work-a-day world, your 399 8-hour days of work becomes 80 weeks of work. That is 28 weeks more than you would work if you were employed on a 5-day week. And 28 weeks is 6 and 1/2 months.

What it really amounts to is that rural women are working one and one half years in a single year. Are you aghast? I was when I first figured it all out. I know now why my mother had to retire to town when she was 50. There was a reason for her health failing: we lived on an unelectrified farm where the average figure of 61 hours of work a week was several hours low. With four children and all kinds of productive enterprises, we were in the hardest working quarter of rural families where homemakers work 70 hours per week, I am sure.

Time may be saved in several ways with electrical equipment. Electric power can substitute for both time and muscle power, as when a small portable motor is attached to a hand-run piece of equipment, like a separator, a churn or a sausage grinder. Or electric equipment may save time in cleaning as compared with lamps or a wood or coal stove. Sometimes it saved time by better arrangement and location as in having a refrigerator in the kitchen as compared with keeping foods in a cellar or spring house, or by having running water at the turn of a faucet instead of getting it out of a well far from the house. It may save trips to town as in the case of a freezer.

Frequently, however, no time is saved at all by having electric equipment, a woman just does more work in the same length of time, she washes more pieces of clothing each time; she irons more pieces because it is easier to do it with electrical equipment. She raises her standards when she can get more work done in the same length of time. In some cases she is unwise to do this; she might better continue leaving certain things unironed and start doing a little more resting, reading or playing with the children.

Many women put their saved time to use in increasing production and income. Let's look at some of the figures on saving time with electrical equipment used in rural homes. The ones below are some we have been using, a composite from various sources:

Time Savings with Electric Equipment Used by Farm
Homemakers in 8-hour Days Saved Per Year

Running water (22-39-63 days)	28
Lighting (2 days cleaning)	22
Washer (nonautomatic 6-20 days)	6
Automatic over nonautomatic laundry with dryer & ironer adds (15-25)	15
Ironer (over sadiron, 11-17)	11
Iron (over sadiron, 10-11)	10
Range (over coal, 14-17)	14
Dishwasher	14
Churn	13½
Vacuum cleaner (6½-32)	9
Good use of complete cleaning system adds	13
Refrigerator	8¼
Milker (11 cows)	50½
Cream separator	15¼
Tank heater (75 days)	4¼
Brooder (55 days use)	5
Lighting adds 2-4 hours to day	91¼

Figures above are selected from various studies, chiefly those made at Illinois, Purdue, and Wisconsin Universities, Iowa, Ohio, and Washington State Colleges, and VPI.

Saving Energy with Electric Household Equipment

From research on human energy costs of laundry activities by Venona Swartz and energy expenditure figures adapted from nutrition textbooks, such as Rose and Sherman's books, we can make some interesting and useful comparisons. Those below are based on human energy requirements above resting, when awake and lying still. Common activities related to work in the home and around the farm are given here first to serve as a basis of comparison and a key to determining points on location and use of equipment:

Human Energy Requirement Above Resting

Awake, lying still	0%
Sitting, at rest	30%
Standing	
Relaxed	38%
At attention	48%
Walking	
2.6 miles an hour	160%
3.75 miles an hour	290%
5.3 miles an hour	744%
Downstairs	372%
Upstairs	1,336%
Running	
5.3 miles an hour	640%

Various trunk, arm and leg movements related to work in the home have been ranked on a basis of consumption of oxygen, from the highest to the lowest by research work done by Esther Crew Bratton of Cornell University Agricultural Experiment Station. The figures in the percent column below are adapted from this research to correspond with other figures in this section. It has been assumed in computing this that "standing comfortably" is the same as standing relaxed.

Activity of body	Height of reach above floor	% above resting
Arm reach and knee-bend	3"	128%
Arm reach and trunk-bend	3"	89%
Stepping up 7"	None	87%
Arm reach and trunk-bend	22"	58%
Arm reach and body erect	72"	55%
Arm reach and 90% body pivot	36"	55%
Arm reach and body erect	56"	45%
Arm reach and body erect	46"	41%
Standing, comfortably erect	None	38%
Awake, lying still	None	0%

Results of this research can be related to use of human energy in performance of various household tasks, either with or without electrical household equipment. You can relate design and location of equipment and its good use to this study and gain an insight into the equipment's value in saving strength.

Figures that are available to make comparisons of doing tasks with different types and usage of electric equipment or without electric equipment are given below:

Human Energy Cost Above Resting for Laundry Tasks

Rinsing, Hanging, etc.		Wringing		Ironing	
Washing by hand	191%	Hand wringer	197%	Sadiron	94%
Rinsing by hand	161%	By hand	138%	Ironing, 5 th iron	86%
Hanging clothes	184%	Electric spinner	125%	Electric iron	
Emptying washer	139%	Electric wringer	99%	standing	79%
Cleaning equipment	149%			sitting	62%
Light laundering	108%			Ironer-flatplate	60%
				Ironer-rotary	45%

Human Energy Cost Above Resting for Housekeeping and Other Tasks

Cleaning		Sewing		Other	
Beating rugs	600%*	Tailoring	72%	Seeing & reading aloud	38%
Vacuum cleaning	236%**	Treadle machine	45%	Dishwashing	86%
Carpet sweeping	136%	Hand sewing	27%	Carpentry, metal work	212%
Broom, bare floor	118%	Motor machine	27%	Horseback riding (trot)	380%
Washing floors	100%			Sawing wood	524%

*Estimated from activities with similar muscular action.

**Hoover study: 102-130% above basal. - 11 -

Some of the newer recommendations on using equipment, such as conventional washers, would undoubtedly change these figures greatly. Use of energy required for some tasks for which figures are given can be eliminated entirely or reduced greatly, as with the automatic washer or electric dryer. Electric fences may eliminate most of the horseback riding connected with herding cattle. An electric range eliminates sawing wood for cooking. Women may share or carry on some of these tasks; men often do some of them.

A careful study of human energy costs of doing various tasks reveals the importance of certain features of equipment, location of these features, arrangement of equipment, use factors and even the value of keeping equipment in repair so that it can save human energy.

As Esther Crew Bratton says, "The importance of the energy cost of the activities does not imply that the use of energy is detrimental to the body. However, the assumption is made that low energy cost is one desirable aim in planning equipment or methods of work, so long as it is not gained at the expense of other important items of cost to the human body, such as muscle strain, postural restriction, poor body alignment, and psychological dislikes."

In the case of the handicapped, ill or aged the energy used in household tasks may mean the difference between life or death, between ability and inability to carry on a job. Some very practical suggestions about this matter come from Wayne University and a lot appeared recently in Electricity on the Farm.

Figures on human energy costs mean more if they are colorful. If you want to use the information, try building up your story with flannelgraph bar charts. Or use crepe paper strips of different lengths on screens or blackboards, posters, blackboard drawings with colored chalk; or slides also can help to get this information across.

Making Money with Electricity

Below are some of the ways in which rural homemakers make money using their electric equipment:

Laundry equipment

- Taking in washings and ironing at home for pay.
- Doing washing and ironing for one other family for pay.
- Renting washer and dryer for neighbors' use.
- Lending iron at 10¢ per hour to neighbors to pay for it.
- Running self-help laundry center for tourist court, neighbors.

Cleaning equipment

- Running a home-cleaning service for rural community.
- Spray finishing home-made furniture for sale.
- Renting vacuum cleaner at 25¢ per hour to neighbors.
- Renting floor sanding and waxing equipment to pay for it.
- Running floor refinishing business as family enterprise.

Education and recreation equipment

- Using TV to entertain older neighborhood children kept for pay.
- Getting radio market reports and weather news as guide for money-making purposes.

Health, beauty and grooming equipment

Continuing beauticians' work at home, for rural women.
Using clippers to cut brothers', sisters and parents' hair for pay.
Cutting neighbor's boys hair with home-owned clippers.

Sewing equipment

Carrying on a dress-making business in home.
Making buttonholes and doing hemstitching for neighbors.
Doing piece-work garment making for local factory.
Making and selling smocks, aprons and matching pot-holders.
Making factory aprons for workers.
Making children's clothes for sister's speciality shop.
Making toys and other holiday specialties for Holiday trade.
Dressing dolls made by local factory.
Making and selling rugs and bed-spreads.
Making slip-covers and draperies in neighbors' homes, using portable sewing machine. Making closet sets.
Making custom-made seat-covers for automobiles.

Electric cooking equipment

Baking bread, cakes, pies and cookies and making doughnuts.
Making Holiday plum puddings and fruit cakes.
Making home-made candies.
Making jams, jellies, butters, preserves and relishes.
Making canned mincemeat--using mixer-grinder, roaster and hotplate.
Making cottage cheese, using electric roaster and refrigerator.

Electric kitchen

Serving Sunday dinners on advance reservation basis.
Taking dinner parties three nights per week.
Catering private parties in home on request.
Taking summer boarders from cities.
Running summer camp for children.

Refrigeration equipment

See preceding list.
Making and holding of butter and buttermilk.
Holding home-made cottage cheese before sale.
Storing thick country cream for special customers.
Holding dressed chickens, other fowl, rabbits, etc.
Keeping vegetables, fruits, eggs and flowers before sale.
Freezing turkey steaks and whole fowls.
Holding party sandwiches, box lunches made for special affairs.
Storing dressed chicken pieces, sorted and packaged.

Mixing equipment

Renting and delivering mixer to neighbors for use at 25¢.
Buffing jewelry.
Making dressings, hard sauce.
Churning butter, making egg nog.
Making bread, cakes, candies, pies, pastries, frozen waffles.
Making jams, jellies, preserves, butters, pickles, relishes.
Improving quality and quantity of output.

Art equipment

Turning, decorating and baking pottery dishes and vases.
Painting and firing ceramic tile, figurines, and dolls.
Making metal objects and jewelry for sale.
Polishing native stones for tourist trade.
Painting and firing china doll faces for plastic dolls.
Cutting, carving and burning wood to make specialty items.
Buffing semi-precious jewel stones.
Mounting pictures on art calendars for small firm.

Food production equipment

Brooding, lighting, feeding and watering poultry flocks for egg and meat production.
Cleaning and grading eggs.
Renting incubating and brooding equipment where not in use.
Incubating eggs and selling baby chicks.
Using fan to cool eggs rapidly.
Brooding pigs, lambs, calves, dogs, other animals.
Using hot-beds to start plants early for neighbors; greenhouse.
Grinding and refrigerating food for minks. Raising chinchillas.
Assisting with or operating dairy business.
Elevating, grinding and mixing grain for poultry and livestock.
Cleaning seed and grain, grading, testing.
Shelling corn.
Drying grain and hay.
Aging hams in incubators 10-12 weeks at 108° F.

Special equipment

Knitting heels and toes for sock factory.
Making doughnuts and popcorn in tourist area.
Using ceramic electric oven for pottery work.

Industrial equipment

Working full- or part-time in a rural industry using electric power.
Doing work at home with special equipment supplied by factory for piece work.

Awards at fairs

Winning prize money on canning, baking, sewing and other exhibits at fairs.
Winning prizes for letters on electric uses.

Some of the ways in which farm homemakers sell their produce and products are as follows:

<u>Food</u>	<u>Other Products</u>
Farm women's market in town	Farm women's market in town
Mail order, mail delivery	Mail order, mail delivery
Delivery route of town customers	Roadside shop
Restaurants	Department stores
Grocery stores	Specialty shops
Door-to-door sale in town	Door-to-door sale
Farm market or roadside stand	Roadside sign
Tourist trade	Displays in tourist shops

Saving Money with Equipment

Saving money with equipment is a highly individual problem, depending chiefly on each homemaker's choice, use, purchase and care of her own equipment.

Costs of equipment ownership: While equipment life varies considerably, operation experience with UL-approved equipment shows some surprisingly long life figures and good averages. Between 5 to 10 percent of total cost per year based on from 20 to 10 years of life respectively, is offered as a guide for spreading ownership cost. Cheap, poor quality small appliances may do well to last 5 years. Ten-year life is often used as a base for major appliances, but it is probably low.

Since REA makes money available to its borrowers at 4 percent for financing wiring, plumbing and equipment purchases we think of a 4 percent interest rate in figuring the interest factor of ownership. Farm families will probably figure this on the basis of the interest they can get when investing the same money, or the interest forgone. A maintenance or upkeep figure sometimes cited is 1 percent of cost.

Any consideration of equipment cost would need to include a cost of ownership figure as well as an operation figure. The ownership figure undoubtedly would not be less than 10 percent of total cost and probably not more than 15 percent. It should cover depreciation, interest, taxes, insurance and upkeep. A common figure for nonelectrical farm equipment is 15 percent, but electrical equipment is thought to be lower.

Figuring equipment operation cost: There are two general ways of figuring what a piece of equipment will cost to operate according to kwh consumption:

- Multiplying its monthly kwh use by average kwh cost for total use.
- Multiplying its monthly kwh use by added kwh cost for individual piece in electrical rate blocks in which equipment falls on top of present use.

In REA, we have usually used the added-kwh-cost method to figure each item and then shown an average cost for the total use. In general, lighting, radios, iron, washer and possibly housewares or small appliances are figured in highest rate brackets; refrigeration, water pump and vacuum cleaner in medium brackets; range and freezer in lower bracket and water heater in lowest bracket. Many REA borrowers publish charts for reference on this. The columns are titled "If your bill now is" - "adding a refrigerator will cost" - "a range..." - "a water heater." You have undoubtedly seen this type of reference chart, which gives a user or a dealer a quick guide to estimating what buying a piece of equipment will add to a bill, based on local rates.

Most of our early major equipment kwh consumption figures based on metered equipment figures are founded on informed use of equipment rather than on uninformed use. In other words, someone spent some time giving the operator some points on economical use of the equipment before the metering test was made. Both types of figures have value to homemakers. An average of a random sample of all users is undoubtedly valuable to power suppliers. The homemaker will probably not be disappointed in comparing her usage figures with such a figure. Figures from informed users with some information on family size and uses made are helpful as a standard of comparison. They also help protect a cooperative electric system from damage by loss of business to competitors.

While valuable for news stories on individual use, the case-study or selected-metering method carries a number of hazards when used to determine an average figure. The metering is often carried on with people who are not typical. Or it lasts for too short periods and falls during periods not representative of use, perhaps hitting special peak usage or slack periods. For average figures, REA suggests to its borrowers:

- Long period metering - 1 year or 4 to 12 weeks spread over 1 year.
- Enough meters on equipment to constitute a scientific sample.
- Random sampling selection for test meter placement.
- Record keeping by owner of equipment.
- Regular checking by power supplier.

A release on this subject is available to guide REA borrowers.

A lot of promotional information gives money cost only for monthly operation of equipment, omitting the kwh consumption figure. Examples, including both kwh figure and total added cost, would help trained people in judging case studies and using the information from them. Farm families on REA-financed systems, who figure their own electric bills, also will understand and appreciate this type of information.

The farm family which gets an explanation of rate structure as related to cost of operation, can use this information wisely in determining how it will affect order of purchase of equipment. We use a special blackboard and special forms for this purpose, but any blackboard can be lined to put across this story of rate blocks and kwh cost.

Operating costs: Special activities or conditions in rural homes influence the average kwh consumption of electric equipment as compared with national figures. Among these are such things as larger families, extra hired help, harvesting, canning, long established habits of conserving water. Household consumption figures used by REA are given below:

Typical Electrical Home Equipment & Power it Uses Per Month

Equipment	KWH	Equipment	KWH
Clock	2	Lighting	20
Coffee maker	5	Radio	8
Dishwasher	2½	Range	100
Fan (household)	2	Refrigerator (8 cu. ft.)	30
Fan (kitchen)	8	Roaster	40
Freezer (20 cu. ft.)	125	Sewing machine	½
Heater (glowing or radiant)	1*	Toaster	3
Heating pad	½*	Vacuum cleaner	2
House heating (oil burner)	25	Waffle iron	2
Iron (hand)	5	Washing machine	3
Ironing machine	10	Water heater	240

*kwh per hour of use.

Quite a little work has been done by REA on the range and water heating figures. Our nation-wide year-long metering survey on range use, just before the War, covered over 200 users. These users made typical informed use of their ranges for cooking. As a result of this study, we felt safe in using 100 kwh per month as an average range consumption figure. Various figures given range from 85 to 140 kwh.

The low water-heating figure was verified by a post-war study. It may increase as water-use habits change. Another figure which is already changing upward is the one on lighting. Leaders in some areas feel it is at least 30 kwh now and may easily double with a little educational work.

A study on kwh consumption figures is being discussed at present in REA, with revision of present figures in mind.

Use and care of equipment: Long life of equipment depends a lot on good use and care. Saving money with electric household equipment depends on these factors too. Farm homemakers are eager for information on using and caring for their equipment to best advantage. Those who weathered the bad farm years from 1921 to 1941 long ago learned the value of thrift. On the other hand, home visits show us too many poorly lighted/ poorly arranged equipment being badly used and cared for. homes with

Figuring savings: When you add all of the costs of purchase, installation, operation and upkeep together for all the equipment a lot of families have been buying, you come up with some staggering figures. Household electric equipment purchases may easily run between \$500 and \$3,500 to get just a few or most of the "savings" benefits we have been talking about.

Before the war, wiring costs were low. But about 60 percent of the electrification has been done in recent years when wiring costs are high. A figure of \$1,500 for a farm wiring job in North Dakota is common where farmsteads are large. Such wiring costs seem high to us, but they are not so bad when figured on a percentage basis in relation to value of farmstead buildings.

Installation costs for major equipment requiring it may average \$50 per unit. Dishwasher installations run higher. Most power suppliers have programs to decrease most installation costs to a more reasonable figure of \$15 to \$25 to the user, for they know a high installation cost often prevents a sale.

A post-war study of 108 farms in Virginia shows costs of about \$600 for a complete water system installation to get running water on the farm.

Individual equipment savings: Savings on individual pieces of equipment are highly individual matters. Since talks on freezers and vacuum cleaners follow-- this one today, these subjects will be covered later.

A working outline with some factors that may influence savings follows the text of this speech. You can add points to this outline as they occur to you or as they come to your attention in your experience. Figures on saving money with equipment exist chiefly in terms of case studies. In some excellent older studies comparisons are hard to make in terms of present-day costs.

Ann Aikin's bulletin on Family Laundry Practices and Costs from the Cornell University Agriculture Experiment Station included 157 farm families among a 368 total. So few farm homemakers send laundry to the commercial laundry that

comparison with this cost is unrealistic in most places. However, if it applies, there are some support figures in the Cornell study and in an article, "Home, Launderette, and Commercial Costs of Laundry in an Indiana Community," Journal of Home Economics, January 1951. However, this last case is not a rural one.

Willie Vie Dowdy mentioned a U. S. Bureau of Mines refrigerator figure of 5¢ per meal leftover savings in her article in October 1951 Kitchen Reporter. She also gave some other good points and figures on possible savings.

REA has long used a "\$100 yearly" figure for a refrigerator's contribution.

Comparative Costs: Users' reports of comparative costs of operating equipment make interesting reading material. These carry weight in local communities. The Sear's bulletin, Farm Electrification Comparative Cost Data, summarizes this information from many colleges. The General Electric research on ranges and water heaters is interesting information to have. NEMA has some releases on this subject. These are useful to power suppliers.

In areas where people are just getting electricity comparative cost information has great value. It is of less interest in already electrified areas, except for ranges and water heaters. A "guestimate" on kwh operation costs conducted with farm audiences is a shocking revelation of misinformation. The range and water heating operating figures guessed are almost unbelievable. It seems to me we are passing the comparative-cost stage in rural electrification, though still we need the information to guide us in answering questions. However, in group meetings, someone in the audience can usually supply it, and this will be more effective.

The advantages of electricity are so great and so interesting that we can concentrate on telling them--"accentuate the positive." as it were.

Selection of equipment: Before buying equipment which is intended to pay its way, a family should consider a number of factors listed below:

Some Factors to Consider in Planning Electrical Equipment Purchases

General Points Related to Planning

Family -size, habits, needs, goals
Amount of money family has to spend
Responsibility of co-op members to
 use of electricity for co-op success
Advantages of electric equipment
Importance in relation to health
Condition of equipment now in use
Cost and results of present method
Initial cost of equipment to buyer
Types available; models; costs
Features: uses, location, cost
Materials and workmanship
Intention of using "saving" features
Equipment dimensions; space available
Installation Costs
Cost of remodeling structures to
 obtain full use of equipment
Auxiliary equipment needed
Storage space costs & problems
Operation cost (kwh consumption)

General Points Related to Planning

Local rate & effect on bill
Factors effecting economical use
Maintenance cost. Estimated life
Money-saving and income-producing
 possibilities of equipment
Possibilities of financing purchases
Desirability of planned purchasing

Points on Specific Pieces of Equipment

Reliability of manufacturer
Dependability of local dealer
Guarantee: servicing facilities
Safety approval (UL): safety features
Sturdiness in construction
Durability in finishes
Simplicity of design
Ease of cleaning
Convenient controls
Plain and complete markings
Complete instructions

For a brief summary of points on individual pieces of equipment our working outlines (REA, USDA) give further ideas.

Status of Rural Electrification

Rural electrification 85% complete: REA estimated that 4,529,620 of the farms recorded in the 1950 Census, or 84.2 percent, were electrified by June 30, 1951. This contrasts with 10.9 percent electrified in 1935. Between 1935 and 1951 nearly 4,000,000 farms were connected to central power lines by all agencies, public and private.

More than 800,000 of the Nation's farms still are unelectrified. In addition, hundreds of thousands of rural nonfarm dwellings, crossroads businesses, schools, churches, and other rural establishments are without electricity.

Many of these unelectrified farms are situated in isolated areas, or in areas of relatively low farm income. Consequently, the most difficult part of the rural electrification extension job remains to be completed.

Cost of REA program: By January 1, 1952, REA had approved \$2,484,443,832 (2½ billion) in loans to 1,076 borrowers. They include 986 cooperatives, 41 public power districts, 24 other public bodies, and 25 commercial power companies. At that time, REA had on file or in process in the field additional loan applications totaling \$330,415,400 (1/3 billion) for system construction and line improvements, chiefly for existing systems financed by REA (total--nearly 3 billion).

Over 1,000 of these REA borrowers now have rural electric facilities in operation. Their facilities include more than 1,150,000 (1 million) miles of line serving over 3,600,000 (over 3½ million) farms and other rural consumers in about 2,600 counties of 46 States, Alaska and the Virgin Islands.

Of all the loans thus far approved by REA, over 80 percent have been for electric distribution facilities. REA makes generation and transmission loans only when borrowers are unable to purchase an adequate supply of power or when a saving would result. Approximately 18 percent of the REA loans have been for construction of generating plants and transmission lines. About one percent of the loans have been made to power system operators for financing farmstead installation of wiring, plumbing, fixtures, electrical equipment and appliances, and irrigation facilities.

More than three-fourths of all consumers on REA-financed cooperative lines of 986 co-ops are farms. But also included are many thousands of rural nonfarm dwellings, schools, churches, stores, community buildings, and similar facilities. REA borrowers also serve thousands of rural industries and other commercial enterprises.

By January 1, 1952, REA had advanced \$1,944,860,101 (almost 2 billion) in loans to its borrowers. Under REA loan contracts, advances are made as the borrowers need funds with which to pay for construction under way or completed. The difference between the amount of loans approved and the amount of funds advanced represents loan funds that are obligated to borrowers. Most of it has been further obligated by the borrowers to pay for materials or contract services and will be advanced as construction proceeds.

By January 1, 1952, the borrowers had returned to the Government approximately \$325,000,000 (1/3 billion) in principal and interest payments on their REA loans. This included more than \$41,000,000 in payments on principal ahead of schedule. Less than \$660,000 was reported more than 30 days overdue. Only one REA loan foreclosure has been necessary to date on an operating power system.

Rural electrification pays its way nationally: The REA program has helped bring prosperity to the United States of America. Below are some fair "guestimates" of money spent with the manufacturers, distributors, or dealers, contractors, engineers, lawyers, laborers, craftsmen, transportation companies and others in the REA program:

Electric system expenditures	2 billion dollars
Wiring, plumbing, and equipment expenditures of farmers	<u>9 billion dollars</u>
Total	<u>11 billion dollars</u>

Uncle Sam started balancing his books, regarding the costs of rural electrification, when he collected taxes on all the money earned or made in bringing "lights to the farm." Local governments also take their share and get large sums in taxes from the electric systems. Uncle Sam collects income tax on the profits farmers get because they have electric farming aids, and excise taxes on the appliances they buy. The productivity and wealth of rural areas increases enormously through rural electrification. And then, as all these cash benefits keep flowing in, Uncle Sam gets gack, with interest, all the money he advanced to prime the pump. Yes, rural electrification pays its way nationally.

Lines constructed by REA borrowers are built to serve entire areas, including less densely settled sections as well as those of greater population. This is known as "area coverage." The test is no longer whether an individual line or section will be self-supporting, but whether the entire system as whole is feasible.

In every region in the United States rural electric cooperatives have demonstrated that farm electrification, far from constituting an additional cash drain on low farm incomes, actually brings about a higher real farm income and better farm living. It brings more business into rural communities. It encourages new local enterprises which come about when low-cost power is available. It stimulates private business, both locally and nationally. Surveys indicate that for every dollar invested in rural power facilities the farmer eventually invests an additional \$4.50 in wiring, plumbing and electrical appliances. As stated previously, this means to date about nine billion dollars worth of related business added to the 2 billion spent for electric systems.

The use of electric power in farm production and processing is constantly expanding. To date about 400 farm uses for electricity have been reported of which at least 250 are productive uses. Electric power on the farm is an economic necessity which can pay its way with handsome profits for the farmer. REA encourages its borrowers to give their consumers guidance as to which uses are the most efficient and the most profitable in these times of power, food, feed, fiber, manpower and metal shortages.

In early stages the rural home has profited most from rural electrification. Until recent years perhaps 90 percent of the use of electricity has been in the home. As farmers have learned more about productive use of equipment and as this equipment has become more widely available, farm electrification for production has been receiving proper emphasis in the rural electrification program. But with all our emphasis on using electricity in food production, we have no desire to reduce the amount used in the home, quite the contrary.

Electrification of rural areas is credited with having a large share in winning World War II. Here are some contributions made:

- It aided directly in production of food, feed and fiber
- Released women's time for farm work
- Helped keep farmers and their families on the farm
- Improved living conditions for hired help on the farm
and kept them there
- Reduced amount of hired labor required

The farm homemaker is contributing to keeping America strong. Electricity can help her in all phases of her big war job - conservation, production, preservation, stabilization:

1. Conservation of time, energy, health, food, fiber, equipment & power.
2. Production of gardens, poultry, eggs, dairy products, livestock and even farm crops.
3. Preservation by freezing, canning, drying and storing.
4. Stabilization - of individual, home and community. Especially stabilization in the home of income for family needs, working conditions, housing and living conditions, education and recreation, and physical and mental health.

Rural educational workers can challenge the homemaker and help her to do a better job. Magazine people can catch her eye with pictures that interest her and tell her a story that will help her with her everyday work, or inspire her to a larger community viewpoint.

Manufacturers can stretch their ingenuity and their supplies to provide her with the equipment she needs. (Which reminds me that in a visit last year to electric equipment shops in 15 European countries, I saw only one full-size range; the rest were all apartment models.) Manufacturers can keep turning out the beautifully illustrated, excellent authentic information pieces that have been the trend in recent years.

More training schools in your home economics laboratories, more aid to governmental agencies with their schools will help educational workers, such as home demonstration agents, homemaking teachers and electrification advisers to help consumers.

For dealers and salespeople, let's spread organizations like Electrical Women's Round Table to reach rural areas. Let's urge more education and even examination and certification in our field. The English system can teach us something on this.

America needs to be strong. It will take all of us, pulling together -government, industry, labor, agriculture - using the best tools, such as electricity, and techniques from advertising, selling and education to hold the line. More things must begin to pay their way in saving human and natural resources. We can help do our part in the home electrification field which we know so well. And I think we can count on the rural homemaker to make electricity pay its way in the rural home, especially if we help her.

3/5/52

Number of Farms and Percent of Farms Having Electricity and Specified Electrical
Appliances, By States, April 1, 1950 1/

State	No. of Farms	Percent of Farms having:							
		Central Station Elec.	Water Pump	Water Heater	Home Freezer	Washing Machine	Chick Brooder	Feed Grinder	Milking Machine
U.S.	5,382,160	77.2	37.5	17.4	12.1	58.4	14.9	1.2	11.8
Ala.	211,512	68.1	18.0	8.1	4.7	32.1	6.8	0.6	1.0
Ariz.	10,412	72.3	44.5	29.8	16.9	60.2	11.3	1.7	20.2
Ark.	182,429	66.7	16.9	5.7	5.8	40.1	5.7	0.7	1.6
Calif.	137,168	90.0	62.1	41.3	21.1	77.8	16.2	1.9	11.3
Colo.	45,578	71.9	40.9	18.2	14.2	66.3	13.3	1.5	9.9
Conn.	15,615	92.3	71.6	27.6	26.0	76.9	13.4	0.9	22.2
Del.	7,448	82.1	62.6	23.3	21.5	71.7	6.6	1.1	14.1
Fla.	56,921	70.8	42.6	19.2	10.5	40.0	7.5	0.5	1.7
Ga.	198,191	75.2	26.7	12.3	5.9	31.4	7.4	0.9	1.5
Idaho	40,284	90.5	64.2	48.6	14.9	85.7	24.7	2.4	29.2
Ill.	195,268	86.5	53.9	25.2	24.5	77.8	33.5	1.8	16.3
Ind.	166,627	91.6	59.6	27.8	22.3	83.0	31.2	1.5	16.9
Iowa	203,159	90.6	57.6	24.9	15.0	84.1	28.5	1.3	20.8
Kans.	131,394	70.2	31.4	13.5	8.6	62.4	14.9	1.0	10.1
Ky.	218,476	66.3	13.2	8.6	5.6	51.3	10.0	0.9	3.3
La.	124,180	66.8	24.5	7.2	11.7	38.1	9.5	0.8	2.1
Maine	30,358	85.6	48.7	12.6	14.0	75.6	7.3	0.7	15.7
Md.	36,107	83.8	57.5	22.4	19.6	69.8	18.2	2.2	15.4
Mass.	22,219	91.2	46.3	15.7	19.1	74.8	13.1	0.9	17.3
Mich.	155,589	94.1	73.4	29.2	18.7	86.8	25.5	2.0	27.2
Minn.	179,100	83.1	56.3	22.4	16.4	77.5	14.0	2.0	36.4
Miss.	251,383	55.8	14.4	6.0	4.5	21.6	5.7	0.5	1.4
Mo.	230,045	68.7	23.2	9.2	7.1	54.7	11.7	1.0	6.2
Mont.	35,085	65.3	43.1	21.8	18.3	64.0	13.4	1.7	9.0
Nebr.	107,183	72.7	35.6	18.7	10.4	66.4	17.0	1.1	8.8
Nev.	3,110	58.2	46.8	24.3	24.8	59.7	11.5	2.5	14.5
N. H.	13,391	94.6	59.0	16.5	15.5	63.4	31.2	0.9	21.9
N. J.	24,838	93.2	78.2	33.9	24.0	76.0	20.3	1.9	15.3
N. Mex.	23,598	55.1	23.7	9.7	11.2	36.5	6.8	0.8	3.9
N. Y.	124,977	93.5	63.8	31.9	23.4	84.3	19.0	1.3	40.7
N. C.	288,508	75.9	24.6	9.4	5.6	45.9	7.5	0.8	1.2
N. Dak.	65,401	54.8	30.3	10.7	12.6	59.9	5.7	1.3	11.6
Ohio	199,359	92.9	59.3	29.5	18.3	83.2	31.6	1.6	20.0
Okla.	142,246	64.7	21.4	7.4	7.3	36.4	8.0	0.7	5.3
Oreg.	59,826	89.4	61.4	50.4	15.5	83.6	17.9	1.6	15.3
Pa.	146,887	90.8	58.1	24.2	21.9	84.0	25.4	1.9	24.0
R. I.	2,598	92.6	71.7	17.6	14.9	66.9	11.0	1.0	19.0
S. C.	139,364	68.0	23.7	9.8	6.6	25.0	9.2	0.7	1.0
S. Dak.	66,462	56.4	25.0	10.9	9.2	58.3	7.0	0.8	8.5
Tenn.	231,631	71.3	18.0	12.6	5.4	48.9	11.1	0.8	2.7
Texas	331,567	77.9	27.0	10.0	11.5	39.5	12.0	0.9	3.0
Utah	24,176	88.5	22.5	33.6	11.5	83.1	12.0	1.8	16.0
Vt.	19,043	91.7	39.9	19.8	19.4	78.2	11.9	0.5	51.6
Va.	150,994	75.6	26.9	10.9	7.7	54.8	9.1	1.4	2.7
Wash.	69,818	91.7	60.6	49.1	14.4	85.4	19.4	1.8	16.5
W. Va.	81,434	72.0	17.1	6.7	5.8	60.3	6.9	1.0	2.8
Wisc.	168,560	92.3	71.9	28.3	21.8	86.9	25.6	1.5	55.9
Wyo.	12,613	63.9	37.4	13.9	13.5	62.6	11.9	1.8	8.6
D. C.	28	64.3	3.6	7.1	-	53.6	3.6	-	-

1/ Source: Preliminary Reports, 1950 Census of Agriculture, U.S. Dept. of Commerce.

2/ Includes all milking machines reported, electric or otherwise.

WORKING OUTLINE ON FACTORS RELATED TO HUMAN SATISFACTION & SAVING OF MOTION,
TIME, ENERGY & MONEY WITH ELECTRIC EQUIPMENT USED IN RURAL HOMES

Motion, Time & Energy Saving Factors

AIR CONDITIONER

Moving fans, opening windows & doors
Taking baths, fanning to keep cool
Other efforts to control temperature
Less cleaning, painting, laundry work

Satisfaction: Good rest at night and cool comfort in daytime surroundings decreases irritation, promotes feeling of well-being.

BLANKETS, SHEETS

Cleaning, storing & handling a number
of covers
Sleeping under weight of covers

Satisfaction: Warmth with little weight and temperature suitable to individual needs of one or more people assures good rest.

CLOCK

Time necessary for regular winding

Satisfaction: Accurate keeping of time without attention except in outages, and is reassuring.

DEHUMIDIFIER

Carrying articles to dry areas
Brushing mold from articles
Removing mildew
Repair of damage to structures, furniture, furnishings, clothes

Satisfaction: Elimination of distasteful work and waste through control of moisture damage gives feeling of accomplishment.

DISHWASHER

Carrying of water in some cases
Assembly of washing & drying supplies
Storage of dirty dishes
Storage of clean dishes
Washing dishes for 2-3 meals at once
Handling dishes in soapy water
Handling dishes in final rinsing

Satisfaction: Recurring, monotonous task is simplified enough for children to handle.

Money Saving Factors

Health benefits of comfortable "climate"
Increase in production & speed of work
Advantages of moisture & dust control
Decrease in laundry, painting & redeco-
rating costs

Purchase cost of blankets, comforters
Storage space for covers
Emergency use with young animals

Few mechanical problems, little care

Problems of insect pests
Damage through wood rotting, metal rust-
ing & corroding
Loss by mold & mildew
More useful space for living & storage

Quantity of detergent used in washing
Amount of water to get desired result
Sanitation & health benefits to family
Breakage of dishes in eliminated steps
Wear on dishcloths, dishtowels, sink
Storage space for dishes
Problems of insect pests and vermin

Motion, Time & Energy Saving Factors

DISPOSAL UNIT (food-waste disposer)

Emptying garbage pail, replacing liner
Cleaning garbage pail
Carrying garbage from house
Reaching to fill or lift pail

Satisfaction: Recurring, distasteful, odorous task is eliminated, reducing pest attraction.

DRYER

Frequency of outdoor drying problems except in Southwest requiring:

Rehanging of clothes after rain
Rewashing of clothes blown down
Carrying clothes to & from line
Cleaning clothes lines, baskets, etc.
Lifting weight of heavy wet clothes
Separate hanging of items washed
Loss of labor by line breakage or soil by dust, birds, dirty pins
Taking items from line
Uneven drying with line hanging
Controlled dampness for ironing from dryer eliminates sprinkling
Elimination of some ironing by proper timing of removal, smoothing & handling of clothes from dryer:
Putting slip covers on furniture
Putting work clothes on stretchers
Folding hot, slightly damp sheets
Distance of drying from washing area

Satisfaction: Cloudiness about 70% of the time, except in the Southwest, causes constant worry in connection with line drying. Many express a dislike for handling heavy wet clothes to hang them, especially in cold weather. The dryer eliminates these problems.

FAN

Walking and moving equipment for work or play to cooler areas
Elimination of some cleaning, redecorating & laundry in kitchen by removing grease with exhaust fan

Satisfaction: Fans can provide a degree of comfort cheaply.

FREEZER

Quantity cooking, processing
Elimination of washing some bowls, pans, cutlery, used in preparation
Decreasing use of mixing & measuring tools & supplies for quantities
Disposal of waste products
Storage of leftovers for later use

Money Saving Factors

Sanitation & health benefits
Problems of insect pests, vermin
Elimination of replacing pails, bags
Value of waste for feed; water used

Hanging space for drying indoors
Weather damage outdoors; mildew problems
Baskets, carts, pins, lines for hanging
Storage space for baskets, pins, clothes
Damage to clothes in hanging
Sun fading effect; stains from soil
Strain of freezing & blowing
Wind tearing & fraying clothes
Loss of clothes weight, lint
Strain of wet hanging weight
Damage by clothes pins, stretching
Wear from rewashing for line soil
Detergents, hot water for rewashing
Decrease in supply of clothes needed
Children's wardrobe cut 1/2
Linen supply cut 1/2
Farm work clothes cut 1/2
Undergarments, wash dresses
Loss by children outgrowing garments
Sanitation benefits of heat drying
Protection from exposure, overwork

Improving efficiency of heating
Speeding defrosting of freezer
Expense of air-conditioning
Effect on cleanliness in kitchen of exhaust fan; moisture removal.

Trips to town for shopping; or
Trips to town to locker plant
Quantity buying or cooking savings
Less hired help for harvest or illnesses
In-season cost of food wanted
Saving of garden surpluses, leftovers
Storage of eggs, poultry in slump period

Motion, Time & Energy Saving Factors

FREEZER (cont.)

1/2 or less time than canning
Decrease in motions over canning
Time & energy of shopping
Decrease in trips to garden, pantry

Satisfaction: Ease of mind comes in having a stock of food on hand for emergencies

HEATING EQUIPMENT

Cleaning problems of fuel types
Thermostatic control cutting time & steps to control heat
Carrying fuel waste products

Money Saving Factors

Food savings of 1-meal packaging
Storage of more food for longer periods from period of abundance to one of scarcity
Canning equipment & its storage space

Space requirement for equipment
Thermostatic control cutting fuel or electrical waste
Types for short-time, small-area use

Satisfaction: Safety, health and cleanliness factors of electric heat interest homemaker.

INTER*COMMUNICATION SYSTEM

Elimination of steps for reaching another person to talk with him; extra trips to carry things

Direction of children & hired help eliminating loss by waste, errors, delays or interruptions.

Satisfaction: Feeling of security comes with contact with family members, especially children.

IRON--DRY

Walking with sadiron to & from stove
Simplicity of sit-down ironing
Waste in bleaching sadiron scorch
Light weight-- less to lift
Large soleplates--few strokes
Siderests or lifts--little lifting
Siderests or lifts--little motion
Slanting handles--little strain

Automatic prevention of scorching
Thermostatic prevention of waste, fire
Availability of low heat for damage prevention to rayon, silk, wool
Fast coverage with large soleplate
One electric iron vs. several sadirons
Explosion hazards of gas irons
Protection of cover by lifts, rests

IRON--STEAM

Elimination of dampening & handling pressing cloths for most pressing
Trips for sprinkling or sponging equipment for drier spots in dampened clothes & excessive wrinkling.

Pressing suits instead of having done
Dry cleaning and pressing at home
Damage of dry ironing without cloth
Damage from overheated iron
Replacements due to worn shiny look

IRONER

Large area soleplate
Sit-down ironing
Roll equipment moves clothes during ironing process

Controlled heat prevention of scorching, heat waste, fire, accident hazards
Elimination of hiring help
Commercial ironing & pressing costs

Satisfaction: Automatic thermostatic heat control lessens worry about damage by scorching. Ironing, one very disliked task in homemaking, is simplified by the iron or ironer.

Motion, Time & Energy Saving Factors

Money Saving Factors

KNIFE SHARPENER

Sharp equipment speeds work
Time and motion in hunting and
changing dull cutting for sharper
equipment

Trips to town to sharpen cutlery
Cost of hiring sharpening done
Replacement of dull equipment
Less waste in peeling, trimming

LIGHTING

Care and cleaning time decrease with
electric lighting
Elimination of hunting equipment in half
dark, moving and regulation of fuel
lamps
Saving time by speeding work
Elimination of necessity for doing over
jobs due to poor seeing
Possible elimination of fatigue and
strain from poor seeing conditions
due to lighting
Less bodily energy consumed by good
seeing conditions
Movement to eliminate shadow

Prevention of accidents, deaths, fire,
theft with electric light
Increase in usefulness of housing space
& apparent size of house
Cost of care of defective eyes resulting
from inadequate lighting
Safety for children with UL or certified
lighting equipment
Increase in length of effective workday
lessens need to hire help
Increased productivity of animals, plants
Quality improvement from cleanliness
resulting from better lighting
Health benefits of health lamps

Satisfaction: Lighting brings cheer and beauty to rural homes, raises morale.
It often starts home improvements and promotes greater cleanliness. It can bring
visual comfort, simplification and improvement of work and better use of space
and environment. It helps to achieve health and happiness in family living and
may improve grades and methods and habits of work of children.

MIXING EQUIPMENT

Beating and blending by electric energy
Elimination of turning grinder
Carrying on other processes while using
mixer
Elimination of some dishwashing by use
of blender
Elimination of aching muscles from
creaming process for farm market cakes;
more time for sleep on Friday night
before Sat. market.

Use of smaller eggs in mixer-made cakes
Uniform success of products with repeti-
tion of mixing speed & careful time
control
Increase in apparent amount of food by
improved mixing method
Home meat grinding vs. locker plant
grinding
Completeness of juice removal by mixer
Use of whole product by blender
Home churning, baking, preserving
Simplicity of quantity preparation

Satisfaction: Elimination of drudgery and fatigue in production for home and
market by use of mixing equipment raises morale. Speed control and lasting
strength in mixer helps produce uniformly good products which improves pride in
work.

PASTEURIZER

Thermostat control eliminates watching
Checking temperature

Prevention of undulant fever and other
expensive diseases controlled by
pasteurization for home & small market.

Satisfaction: Assurance of relative safety of milk gives secure feeling to parents.

Motion, Time & Energy Saving Factors

Money Saving Factors

RADIO, TELEVISION

Aid in keeping bed-ridden patients
quiet, children busy, etc.

Trips to town for entertainment
Health benefits for ill family members

Satisfaction: Recreation and education comes to the rural home through radio and television, making rural living more satisfying and rewarding.

RANGE & ROASTER

No kindling or cobs to gather
No wood to chop and carry
No fuel to carry or tanks to fill
No fires to start, tend or control
No carrying ashes nor cleaning up dust
Less cleaning, painting, redecorating
Less laundry and washing of surfaces
No pipes or exhausts to clean
Less scorching, less scouring and
scrubbing of dirty pans & range parts
Absent cookery with time/or temperature
controls
Prevention of boil-overs on range by
time controls, time signals
Elimination of trips to range and
watching by time and temperature
controls, time signals
Time waste in cooling or heating
range to proper temperature with-
out heat controls
Checking for safety points on fuel
ranges

Decrease in cleaning and painting expenses
from cleanliness effect on range,
utensils, ceiling, walls, cabinets,
floors, woodwork, curtains, furnishings,
towels, dishcloths
Possibility of controlled heat preventing
loss of lard from overheating in render-
ing, frying, etc.
Failures in baked products from lack of
temperature control, time signals
Safety from fire, explosions
Good use resulting in smaller number of
utensils
Health benefits - elimination of combus-
tion problems, ease of protective cook-
ing with controlled heat
Simplicity of eliminating wear and tear on
utensils due to prevention of overheating
and scouring by controlled heat in
oven, on surface
Waste of fuel by pilot lights, continuous
range operation, heating of whole range
Operation cost of refrigerator lower in
cooler kitchen
Ease of home baking, canning
Prevention of evaporation heat loss through
using little water with controlled heat
available
Storage of heat by oven, units
Solutions to kitchen heating and water
heating problems

Satisfaction: Accuracy of time and temperature controls on electric ranges relieve the mind of some worry connected with cooking and give assurance of producing results of which the homemaker can be proud. Safety features eliminate worry relating to possibility of chimney fires, explosions, children playing with cooking equipment.

REFRIGERATOR

Tiresome repetitive trips to porch,
pump or cellar for food
Decrease in trips to garden, to store
Handling or storing ice or fuel
Removal of ice drain water
Quantity preparation of food
Advance washing of some food

Ice or gas cost vs. electrical cost
Trips to town for shopping
Loss from ants, vermin, animals getting
into food stored in open
Loss by leakage & rope breaking in well
Expense of hiring help at harvest time
due to poor storage facilities

Motion, Time & Energy Saving Factors

Money Saving Factors

REFRIGERATOR (Cont.)

Washing of containers of sour milk
Frequent cleaning of ice and fuel-burning refrigerators; cleaning of surrounding area
Convenience of storage space in electric refrigerator
Boiling & canning to prevent food loss by spoilage

Loss of food bought for harvest crews because of delays caused by rain
Quantity food purchase with refrigerator
Making ice cream vs. buying it
Loss by spoilage, wasted leftovers
Holding surplus fruits and vegetables
Loss of flour products by drying and molding without refrigeration
Better use of leftovers due to delay
Health problems due to exposure in going outside from hot kitchen to get stored food
Importance in health of babies
Loss of work through illness from summertime food spoilage
Deaths from food poisonings (fallen off 67%* in U. S. since 1927)
Boiling stored food to stop micro-organism growth

Satisfaction: The added pleasure of eating and increased consumption of certain foods when cool and the added variety and attractiveness of food improves nutrition and family eating habits.

SEWING MACHINE

Shopping to buy clothes to fit
Additional energy requirement for seeing to sew by hand
Rapidity of electric vs. treadle machine or hand sewing
Energy requirement for using treadle machine vs. electric

Making boys and men's shorts, pajamas, work shirts; suit and coat makeovers
Making own and daughters' clothes
Greater wear from clothes made to fit muscular farm people
Making patch quilts, rag rugs
Doing own hemstitching, picoting, button-hole making instead of hiring it done
Mending torn clothes & hose to prevent loss
Turning collars, stitching frayed rugs
Preventing accidents by quick repair
Mending sacks, tarpaulins, animal blankets, machine covers
Saving loss of sight from hand quilting, fine needlework
Recovering furniture, making slip covers for furniture
Making Christmas gifts vs. buying
Home use of feed bags, grain sacks, worn linens
Making hard-to-get expensive farm items: chutes, filters, tractor sunshade
Re-hemming window blinds

Satisfaction: Pride of creation and money savings in home sewing encourages homemaker to feel she is making real contribution to family well-being.

*Metropolitan Life Insurance study.

Motion, Time & Energy Saving Factors

Money Saving Factors

TOASTER; WAFFLEBAKER: OTHER TABLE COOKING APPLIANCES

Elimination of trips to and from
range by using equipment at table
Time-saving by using during meal

Thermostatic control of temperature
lessening loss by burning
Lower cost than using electric range
for toasting small amounts of bread,
making waffles, using broiler
Requirements for storage space relatively
small

Satisfaction: Table appliances allow homemaker to sit at the table with the family
and to enjoy their company while cooking.

VACUUM CLEANER

Elimination of beating & shaking
of rugs, woolen covers & clothes
Elimination of major house clean-
ing by regular cleaning

Wear from grit and sand left in rugs
Decrease in moth damage through
regular, thorough cleaning
Decrease in cleaning bills
Decrease in accidents by use of
cleaning tools on walls, ceilings,
woodwork, draperies
Delousing chicks by cleaning before dust-
ing; cleaning nests; cleaning poultry
house walls before spraying whitewash
Catching down when cleaning ducks

WASHER--NONAUTOMATIC

Emptying without pump or drain
Rubbing on board by hand and
moving clothes through soapy
water in hand washing
Cranking gas engine or hand
operation of nonmechanical type
Energy and time of hand wringing
Energy of turning hand wringer
Time and energy of hand rinsing

Elimination of hiring help for washing
Expense of gasoline, oil, battery
Commercial laundry expenses
Soap rubbed on at washboard
Effect of bleaches, boiling on clothes
Possibility of more profitable use of
time & strength for income-production
purposes

WASHER--AUTOMATIC

Elimination of handling clothes
during washing process
Elimination of filling & emptying
washer
Less frequent cleaning of equipment
Little care required
Some walking to and from machine
Effort of lifting clothes to wringer
or spinner extraction basket
Time of feeding clothes through
wringer, hand or machine rinses

Hired help or commercial laundry costs
Elimination of nearly all items of
auxiliary laundry equipment
Space or storage space for auxiliary
laundry equipment
Need of fewer clothes & linens; storage
space for them in house
Washing items dry cleaned
Amount of detergent required
Elimination of wringer damage

Satisfaction: Clean clothes, furnishings and linens promote a feeling of well-
being and help protect health.

Motion, Time & Energy Saving Factors

Money Saving Factors

WATER SYSTEM, WATER HEATING

Hand pumping and gas engine
starting time and energy loss
Losses in carrying water in & out
Lifting weight of water for
carrying, heating, and use
Time loss in filling & emptying
water containers
Loss of time & energy spent in
planting garden due to drought

Health benefits of improved sanitation
Decrease in illness from exposure
to carry water in winter months
Some fire protection
Cleansing action of soap and hot water
Loss in production of milk, meat, eggs,
garden produce without ready water
supply
Loss of premium paid for quality milk
due to lack of cleanliness
Saving loss of shrubbery purchased

Satisfaction: Improvement of living standards depend largely on running water.

WIRING (ADEQUATE)

Little walking to control lighting
Trips to change fuses or reset
protective devices
Moving equipment due to shortage
of outlets

Elimination of electrical loss over small
wires, overloaded circuits
Economical operation of equipment
Damage of motors, wiring
Loss of light from low voltage
Repairs to equipment from under-voltage
Fire and accident prevention
Safety for humans, animals

Satisfaction: Adequate wiring and convenient location of switches and outlets provide good performance and prevents frustration in use of equipment. Safety in wiring and its values in protection of life and property is reassuring.